CHAPTER 5

STRUCTURAL AND ARCHITECTURAL DESIGN

5-1. General structural and architectural design

The facility shall provide suitable space for the installation, operation, and maintenance of all utility systems. Structural designs shall utilize material efficiently, provide maximum usable space, minimize the use of special equipment, and be constructed by conventional methods. Consideration shall be given to future uses of the facilities, possibilities of alterations, and maintenance costs. Structural systems shall be compatible with their environment and meet functional needs. Additional design considerations to counter specific threats are covered in appendices to this standard.

5-2. Foundation design

Foundation design shall conform to Technical Manual (TM) 5-818-1, Soils and Geology: Procedures for Foundation Design of Buildings and Other Structures (except Hydraulic Structures).

5-3. Functional layout

Large C4ISR sites will include all of the areas listed below. Smaller sites will only have a subset of the areas described.

a. The generator room houses the generators and auxiliaries and shall allow sufficient work area around the equipment for normal operation, maintenance, and overhaul. Adequate space shall be provided for engine tear-down and overhead cranes provided for lifting engine/generator components.

b. An area shall be provided for maintenance and repair of equipment, including special shops for mechanical and electrical maintenance. Areas are required for parts storage, tool storage, and storage of toxic/flammable liquids.

c. The CR shall house the control consoles, instrument panels, computer systems, and switching and monitoring equipment necessary for central operation of the plant. The operators shall be able to view the generator room equipment from the CR. The operators should also be able to view the distribution switchgear room.

d. Electrical equipment areas, battery rooms, mechanical/fire protection areas, and other support equipment shall be separated from each other and the other areas in the facilities. Support areas shall be separated by fire walls.

(1) A mechanical/chiller room is required for housing heating, ventilating, and air conditioning (HVAC) equipment for the power plant. Fire protection support equipment and air compressor equipment shall be placed in separate rooms.

(2) Electrical equipment areas are required to house switchgear and related equipment.

(3) A separate battery room is required for large capacity UPS systems utilizing wet-cell batteries.

e. The planning and design phases should incorporate the applicable building and site design standards required by the Unified Facilities Criteria (UFC) and DOD minimum anti-terrorism/force protection (AT/FP) standards for buildings.

5-4. Exterior walls and roofs

The exposed exterior surface material and roofing system with insulation shall be cost-effective, based on life-cycle cost studies. Architectural style, including exposed surface materials, shall be compatible with the design and materials of other buildings in the area.

5-5. Floors and floor finishes

Floors in the facility shall be constructed of reinforced concrete. Equipment and maintenance areas shall have a dust-proofing sealer on the concrete. A raised access floor shall be provided in the CR. Offices, break room, and CR shall have resilient flooring. Floors in the toilet and locker room shall have an easily cleaned impervious finish. Floors in the battery area shall have an acid-resistant finish.

5-6. Acoustical treatment

Noise abatement shall meet the requirements of Department of the Army Pamphlet (DA PAM) 40-501, Hearing Conservation Program. The noise level shall not expose the occupants to sound levels in excess of those shown in MIL-STD-1472, Human Engineering Design Criteria for Military Systems, Equipment, and Facilities; MIL-STD-1474, Noise Limits for Military Material; and DA PAM 40-501. Sound pressure levels within the CR shall not exceed 60 dBa. The facility design and materials shall interrelate and optimize the following factors - arrangement and spacing of the engines, acoustical insulation and design of exhaust and intake systems, and acoustical characteristics of the building construction.

5-7. Life-safety

Building design shall conform to the requirements of National Fire Protection Association (NFPA) 101, Life Safety Code.

5-8. Eye washes and showers

Eye wash fountains and emergency showers shall be included in the battery and maintenance areas.